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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,462	09/22/2003	Tien-Hui Chen	TOP 333	5522

23995 7590 02/16/2007  
RABIN & Berdo, PC  
1101 14TH STREET, NW  
SUITE 500  
WASHINGTON, DC 20005

EXAMINER
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TORRES, JUAN A

ART UNIT	PAPER NUMBER
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2611

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/16/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/665,462

Applicant(s)

CHEN ET/AL.

Examiner

Juan A. Torres

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

The drawings are objected to because:

a) Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see specification page 1 lines 23-27). See MPEP § 608.02(g).

b) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "242" and "296" (figure 2).

c) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "E<sub>c</sub>" (page 4 line 17), "C<sub>k</sub>" (page 4 line 18).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

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application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The abstract of the disclosure is objected to because in line 2 the recitation "ISI" is improper because this acronym has not been introduced previously; it is suggested to be changed to "inter symbol interference (ISI)". Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities:

a) The recitation " $Y_{cd}$ " in page 4 line 11 is improper (see figure 2); it is suggested to be changed to " $Y_{cb}$ ".

b) The recitation "FEF" in page 4 line 15 is improper (see figure 2); it is suggested to be changed to "FFF".

c) The recitation "CCK" in page 4 line 20 is improper because this acronym has not been introduced previously; it is suggested to be changed to "Complementary Code Keying (CCK)".

d) The recitation "adder 270" in page 6 line 14 is improper (see figure 2); it is suggested to be changed to "adder 290".

e) The recitation " $E_c$ " in page 6 line 27 is improper (see figure 2); it is suggested to be changed to " $E_s$ ".

f) The recitation “ $i$  is a predetermined gain” in page 7 line 10 is improper (see equation (9)); it is suggested to be changed to “ $\mu$  is a predetermined gain”.

Appropriate correction is required.

### ***Claim Objections***

Claims 1-3 are objected to because of the following informalities:

As per claim 1 the recitation “ISI” in line 2 of claim 1 is improper because this acronym has not been introduced previously; it is suggested to be changed to “inter symbol interference (ISI)”.

As per claims 2-3, they are objected because they depend directly from claim 1 and claim 1 is objected.

Claim 2 is objected to because of the following informalities: the recitation in line 8 of claim 2 “ $i$  is a predetermined gain” is improper (see claim 2 line 5); it is suggested to be changed to “ $\mu$  is a predetermined gain”.

Claim 5 is objected to because of the following informalities: the recitation in line 8 of claim 5 “ $i$  is a predetermined gain” is improper (see claim 5 line 5); it is suggested to be changed to “ $\mu$  is a predetermined gain”.

Claims 7-10 are objected to because of the following informalities:

As per claim 7 the recitation “ICI” in line 2 of claim 7 is improper because this acronym has not been introduced previously; it is suggested to be changed to “inter carrier interference (ICI)”.

As per claims 8-10, they are objected because they depend directly from claim 7 and claim 7 is objected.

Claim 8 is objected to because of the following informalities: the recitation in line 8 of claim 8 "i is a predetermined gain" is improper (see claim 8 line 5); it is suggested to be changed to " $\mu$  is a predetermined gain".

Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-6 are rejected because they claim an abstract idea or calculation that are directed to an algorithm for updating coefficients in a decision feedback equalizer that consists solely of the manipulation of abstract ideas that don't produce any practical application that produces a useful, concrete and tangible result, that is not statutory subject of matter. See *In re Warmerdam*, 33 F.3d 1354, 1360, 31 USPQ2d 1754, 1759 (Fed. Cir.1994). See also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459. Claims 1-6 don't produce any practical application that produces a useful, concrete and tangible result *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-02 (emphasis added).

***Allowable Subject Matter***

Claims 7-10 allowed (if the above objections are overcome).

The following is an examiner's statement of reasons for allowance: claims 7-10 are allowed because the references cited fail to teach, as applicant has a decision feedback equalizer, comprising: an ICI canceller for canceling ICI from a signal received

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from a channel and outputting a first signal without ICI; and an ISI canceller, comprising: a symbol decoder for decoding a first symbol comprising a set of the first signals to generate a decoded symbol; and a symbol-base feedback filter with a plurality coefficients for transforming the decoded symbol by a Toeplitz Matrix  $H(m)$  to cancel ISI from the present decoded symbol, and generating an output signal; wherein the first symbol has  $(k+1)$  chips, the Toeplitz Matrix is a  $(k+1) \times (k+1)$  matrix,  $m$  is the symbol time of the first symbol, the chip times of the first symbol are from  $(n-k)$  to  $n$ ,  $n$ ,  $k$  and  $m$  are natural numbers and  $n=(k+1)m$ ;

$$H(m) = \begin{bmatrix} \left( \sum_{i=0}^k E^*(n-i)C(n-i) \right) / (k+1) & \left( \sum_{i=0}^{k-1} E^*(n-(i+1))C(n-i) \right) / k & \dots & \dots & E^*(n-k)C(n) \\ \left( \sum_{i=0}^{k-1} E^*(n-i)C(n-(i+1)) \right) / k & \left( \sum_{i=0}^k E^*(n-i)C(n-i) \right) / (k+1) & & \left( \sum_{i=0}^{k-(k-1)} E^*(n-(i+k-1))C(n-i) \right) / 2 & \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \left( \sum_{i=0}^{k-(k-1)} E^*(n-i)C(n-(i+k-1)) \right) / 2 & \left( \sum_{i=0}^{k-(k-2)} E^*(n-i)C(n-(i+k-2)) \right) / 3 & \dots & \dots & \left( \sum_{i=0}^{k-1} E^*(n-(i+1))C(n-i) \right) / k \\ E^*(n-k)C(n) & \left( \sum_{i=0}^{k-(k-1)} E^*(n-i)C(n-(i+k-1)) \right) / 2 & \dots & \dots & \left( \sum_{i=0}^k E^*(n-i)C(n-i) \right) / (k+1) \end{bmatrix}$$

where  $E(n)$  is a vector of error values computed as the difference between the chip of the decoded symbol at the chip time  $n$ , and the chip input to the symbol decoder at the chip time  $n$ , and  $C(n)$  is the chip of the decoded symbol at the chip time  $n$ , as the applicant has claimed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Inkyu ("A fast computation algorithm for the decision feedback equalizer", IEEE Transactions on Communications, Nov 1995 Volume: 43, issue: 11 page(s): 2742-2749) discloses a fast start-up equalization using the approximation of a Toeplitz correlation matrix by a circulant matrix. Webster (US 6690715 B2) discloses a decision feedback equalizer to cancel both inter-codeword interference (ISI) or "bleed-over" between codewords, and intra-codeword chip interference (ICI) or smearing of the energy within the chips of a respective codeword. Wang (US 20040101068 A1) discloses an embedded decision feedback equalizer (DFE) with ICI/ISI cancellation arrangement that can cope with channel-induced distortions. Lin (US 20040146129 A1) discloses a decision feedback equalizer (DFE) to generate a decision based on a whole codeword to replace chip decisions generated previously, to reconstruct post-cursor section of channel impulse response more precisely. Chen (US 7113553 B2) discloses an 802.11b Complementary Code Keying (CCK) receiver, which mitigates inter-symbol and intra-symbol distortions due to multipath propagation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone



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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres  
10-24-2006

TEMESGHEN GHEBRETISSAE  
PRIMARY EXAMINER  
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